Efforts to Control Work Accident Risks in Steel Construction Work Using the Job Safety Analysis (JSA) Method. (Case Study at Pt. Xyz)

Muhammad Abdan Syakuro Billah¹, Akhmad Wasiur Rizqi², Moh. Jufriyanto³

^{1.2.3}Industrial Engineering Study Program, Faculty of Engineering, University of Muhammadiyah Gresik Jl. Sumatra No.101, Mount Malang, Randuagung, Kebomas District, Gresik Regency, East Java, 61121 Email: <u>Abdanscr@gmail.com</u>

ABSTRACT

PT. XYZ is a PT engaged in general contracting, outsourcing, trading and services. In the company there are several workers who had work accidents. According to existing data for 2021-2022 in fabrication work, most accidents are related to negligence of workers at PT. XYZ, namely in the grinding process from being cut to tripping over cables, so the authors conducted this research aiming to reduce and minimize work accidents of workers in the workplace. This research was conducted by measuring accidents in every activity at PT. XYZ. Data processing is done by calculating the level of risk assessment, then determining the level of efficiency to be achieved using the Job Safety Analysis (JSA) method. The results of the risk assessment for each job show that there is one highest level of risk, namely in the drilling section with a likelihood value of three and a severity level of four. From the results of risk control in the fabrication process, it can be carried out by means of technical control (repairing or adding technical equipment such as installation Occupational Health and Safety signs), administrative control (briefing before work, using special tools to lift materials), and using PPE. Proposed improvements that can be given are the addition of several personal protective equipment suitable for work at the fabrication site, namely the use of gloves, wearing masks, gloves, safety shoes and welding goggles. From the results of risk control in the fabrication process, it can be carried out by means of technical control (repairing or adding technical equipment such as installing K3 signs), administrative control (briefing before work, using special tools to lift material), and using PPE. Proposed improvements that can be given are the addition of several personal protective equipment suitable for work at the fabrication site, namely the use of gloves, wearing masks, Occupational Health, and Safety signs), administrative control (briefing before work, using special tools to lift materials), and using PPE. Proposed improvements that can be given are the addition of several personal protective equipment suitable for work at the fabrication site, namely the use of gloves, wearing masks, gloves, safety shoes and welding goggles.

Keyword: JSA, Fabrication, Work Accident

Introduction

The role of humans in the company cannot be separated from the dangers of work accidents. Many factors can influence the occurrence of work accidents such as wrong working methods, unsafe work environment, PPE which is inadequate. The impact of work accidents also varies, ranging from minor accidents such as tripping to major accidents such as fires that cause death[1]-[2]

Risk is something that is often attached to every activity in a job. In the field of K3, risks that have the potential to cause large losses are things that must be controlled because they can threaten the safety of employees. Risks can be avoided by carrying out potential countermeasures so that the impact can be reduced[3]-[4]

The level of risk that is known before it occurs is very important in controlling risk. In tackling OHS risks, risk management is carried out to prevent accidents and minimize risks that occur due to work accidents. Risk management is a risk management activity that aims to prevent unwanted work accidents in detail, complete, planned and structured in a good system.[5].Based on[6]in 2021 there are 82 thousand cases of work accidents in Indonesia. To reduce the number of work accidents, it is necessary to hold a work accident prevention program, namely by implementing Risk Management to find out the dangers and potential magnitude of risks that exist in the workplace which currently do not exist in the company. So that preventive measures and control can be taken against these hazards, as an effort to protect company assets from damage, production disruptions, losses and additional costs incurred.[7]-[4]

Occupational accidents are incidents that are unintentional and unwanted, small accidents are often underestimated even though small accidents are the beginning of fatal accidents.[8]. Accidents that occur in a work relationship are called work accidents, meaning that accidents occur due to work, both occurring at work

and when leaving/returning from work. In this case work accidents can occur due to hazardous conditions related to machines, work environment, production processes, the nature of work, and work methods. Occupational accidents can also occur as a result of dangerous actions which in some cases can be motivated by a lack of knowledge and skills, bodily defects, fatigue and tiredness/sluggishness, unsafe attitudes and behavior.[9]-[10]

Occupational safety and health (K3) is an integral part of the employment system which is directly related to human resources.[11]. With K3 the company can minimize accident cases that result in material losses and casualties. At this time all industrial companies are required by the government to always pay attention to Occupational Health and Safety K3. Because safety and health K3 is one of the important factors that can affect employee work productivity. The risk of work-related accidents or illness often occurs because the K3 program is not running well. This can have an impact on the level of employee productivity[12]-[13]

PT. XYZ which is located on Jl. Betoyo Kauman No.KM 12.5 Kec.Manyar Gresik Regency, East Java 61151 Is a company engaged in the implementation of steel plate construction and fabrication services. In its implementation, PT. XYZ more often gets tenders on steel plate fabrication work. In steel plate fabrication work, workers are directly involved in marking, cutting, grinding, drilling, welding and painting activities which have a high and dangerous risk of work accidents. The K3 division at this company still uses assistance from external parties, so it does not have a good administrative record regarding work accidents in the fabrication process, this company already has a minimum PPE completeness standard such as gloves, welding goggles, special safety shoes, sandblasting masks, and safety shoes. helmet.

This research was conducted to identify the hazards of work risks that occur, calculate the value and level of the highest work risks found in the production area at PT. XYZ.

Research methods

Job Safety Analysis (JSA) is an analytical technique used to identify the hazards present in a person's job and develop ways to reduce the risk of accidents.[14]

The purpose of this JSA method is to identify potential hazards in each work activity[13]. JSA is also used to eliminate or prevent hazards to occupational safety and health in the workplace and to support more effective working methods[15] -[16]

The steps in conducting a Job Safety Analysis are as follows[17]:

- a. Select the job to analyze
- b. Breaking work down into activity steps
- c. Identify potential hazards at each step
- d. Identify the risks in each potential hazard

The application of occupational safety and health in companies is important to create a safe work environment and reduce the number of work accidents. By establishing systematic work operations, establishing correct work procedures, and ensuring that every worker has received proper training, occupational accidents and diseases can be prevented. results at work[18]-[19]-[20]

To conduct this research, what the authors did was to make direct observations on the fabrication section at PT. XYZ regarding the problems in that section. The first stage is to identify the problems that exist in PT. XYZ which will be solved through research conducted. Then formulate conflicts that occur in the field so that the research carried out can run smoothly with the desired goals.

The formulation of the problem is adjusted to the needs in the field, namely for OSH research using the JSA method. after identifying and formulating the next problem is to determine research objectives, so that researchers are more focused on finding data, solutions and contributions within the company. The next stage is the reference search stage. It can be from books, journals, and pre-existing research. Field survey to see directly the field situation in the maintenance process At this data collection stage, the data needed to overcome data problems is collected in the form of work accident data and direct observation. After field studies, namely the author performs data processing using the Job Safety Analysis (JSA) method, the data obtained from the data collection process is processed by providing suggestions for improvements with JSA to minimize work accidents. the last is Conclusion At this stage the researcher draws conclusions from the results of the analysis of data processing using the JSA method. Field survey to see directly the field situation in the maintenance process At this data collection stage, the data needed to overcome data problems is collected in the form of work accident data and direct observation. After field studies, namely the author performs data processing using the Job Safety Analysis (JSA) method, the data obtained from the data collection process is processed by providing suggestions for improvement with the JSA to minimize work accidents. the last is Conclusion At this stage the researcher draws conclusions from the results of the analysis of data processing using the JSA method. Field survey to see directly the field situation in the maintenance process At this data collection stage, the data needed

to overcome data problems is collected in the form of work accident data and direct observation. After the field study, namely the authors carried out data processing using the Job Safety Analysis (JSA) method, the data obtained from the data collection process was processed by providing suggestions for improvements with JSA to minimize work accidents, the last is Conclusion At this stage the researcher draws conclusions from the results of the analysis of data processing using the JSA method. After the field study, namely the authors carried out data processing using the Job Safety Analysis (JSA) method, the data obtained from the data collection process was processed by providing suggestions for improvements with JSA to minimize work accidents. the last is Conclusion At this stage the researcher draws conclusions from the results of the analysis of data processing using the JSA method. After the field study, namely the authors carried out data processing using the Job Safety Analysis (JSA) method, the data obtained from the data collection process was processed by providing suggestions for improvements with JSA to minimize work accidents. the last is Conclusion At this stage the researcher draws conclusions from the results of the analysis of data processing using the JSA method. After the field study, namely the authors carried out data processing using the Job Safety Analysis (JSA) method, the data obtained from the data collection process was processed by providing suggestions for improvements with JSA to minimize work accidents. the last is Conclusion At this stage the researcher draws conclusions from the results of the analysis of data processing using the JSA method. After the field study, namely the authors carried out data processing using the Job Safety Analysis (JSA) method, the data obtained from the data collection process was processed by providing suggestions for improvements with JSA to minimize work accidents.

Results and Discussion

From the results of observations that occurred in the field, there are hazards in the fabrication process which consists of marking, cutting, grinding, drilling, welding and painting processes at PT. XYZ. Then the likelihood value and severity level can be determined to determine the risk value to get the risk level.

. . .

I able I Results of Hazard Identification In the fabrication process							
Process	Rare Jobs	Danger	Stake				
mark		Worker cutting steel plate	Scuffs, scratches				
	Draw a pattern on the material	Worker trips over steel plate	Bruises, abrasions, lacerations				
		Backache workers	Twisted back				
	Lifting material	Workers experience muscle cramps when loading material into the cutting machine	Cramps, sprains				
Cutting	Prepare the machine	Tripped over the cord	Cuts, bruises, sprains				
Culling	Cut the material according to	Worker's hand is scratched by cutting machine	Scratches				
	the pattern already in the picture	Workers experience noise	Hearing disorders				
		Worker cutting steel plate	Scuffs, scratches				
	Laying material	The worker is crushed by the material to be moved	bruises				
	Cat your anin dan naady	Worker trips over grinding machine cable	Bruises, sprains				
	Get your grinder ready	The worker is electrocuted	Burns				
arind		Worker's hand is scratched by a grinder	Wounds, scratches,				
grind		Workers inhale dust from cutting	Shortness of breath, cough				
	Flatten the cut plate	Workers are splashed with steel plates that bounce off during the grinding process	Bruises, abrasions				
		The worker was hit by a grinding knife	Scratch wound				
Drilling	Laying material	Worker squeezed material	Bruises, abrasions, broken bones				
		Backache workers	Back pain				

⁸⁴⁴

SITEKIN: Jurnal Sains, Teknologi dan Industri, Vol. 20, No. 2, June 2023, pp. 842 - 849 ISSN2407-0939 copies/ISSN 2721-2041on line

Process	Rare Jobs	Danger	Stake
	Malsa a hala in tha nlata	Worker trips over drill string	Sprains, abrasions
	Make a note in the plate	Workers exposed to splash gram	Scuffs, scratches
welding	Prepare the welder	Blisters, bruises	
		Workers inhale welding fumes	Out of breath
	Waldad staal plata	Workers exposed to welding fire	Burns, burns
	welded steel plate	Wonkers averaged to welding rediction	Damage to eyes and
		workers exposed to welding radiation	skin
painting	Painting all materials	Worker painting too close	Dizziness, fainting

Risk assessment is obtained using a risk management approach, namely by determining the value of the risk score by multiplying the probability value with the risk severity level of the hazard that has been identified in the fabrication process. With the value of the risk score, the risk level of the identified hazard will be determined

Data processing

	Rare Jobs	Danger	Stake	Risk level	Risk control		
Process					Technical control	Administrative control	PPE
mark	Draw a pattern on the material	Worker cutting steel plate	Scuffs, scratches	R		Giving directions, providing first aid, Giving sanctions to workers who do not use PPE	Gloves, safety shoes
		Worker trips over steel plate	Bruises, abrasions, lacerations	R		Giving directions before work, placing steel plates according to their place, Giving sanctions to workers who do not wear PPE	Safety shoes
		Backache workers	Twisted back	R		Briefing before work, Providing First Aid	
	Lifting material	Workers experience muscle cramps when loading material into the cutting machine	Cramps, sprains	R		Briefing before work, using special lifting equipment to lift material, Providing First Aid	
Cutting	Prepare the machine	Tripped over the cord	Cuts, bruises, sprains	S		Make a special place for laying the cable cutting machine	
	Cut the material according to the pattern already in the picture	Worker's hand is scratched by cutting machine	Scratches	М		Giving directions, Providing first aid, Giving sanctions to workers who do not use PPE	Safety gloves
		Workers experience noise	Hearing disorders	L		Briefing before work, providing K3 training, giving sanctions to workers who do not use PPE	Earmuffs Earmuffs
grind	Laying material	Worker	Scuffs, scratches	L		Giving directions, Providing first aid	Safety

Table2Risk control in the fabrication process

Process Mark Danger Stake Notice Technical Administrative control PPE plate plate plate Giving special lifting cuprent to hit material, Powiding Giving special lifting cuprent to hit material, Powiding Safety shoes Get your grinder ready The worker trips over grinding machine cable Bruises, sprains M Make a special place to put the grinding machine cable Safety shoes Get your grinder ready The worker trips over grinding machine Burns L M Make a special place to put the grinding machine cable Safety shoes M Worker's inhale dust from cutting Burns L Check the grinding machine cable Safety shoes Worker's inhale dust from cutting Shortness are splashed with steel process L Burns seratched by a grinder L Shortness are splashed L Workers inhale dust from cutting Shortness are splashed L Briefing before work, forming a K3 division, imposing sanctions on workers Safety shoes, goggles Workers inhale dust from cutting Shortness are splashed L Briefing before work, forming a cording to soOP Safety shoes, goggles Workers inhale dust from grinding Shortness are splashed L Briefing before work, forming a cording to soOP Safety shoes, goggles Drilling Laying mate		Para			Rick		Risk control	
Participant plate Image: service of the service of th	Process	Jobs	Danger	Stake	level	Technical control	Administrative control	PPE
Pilling Laying Worker's surface Normalization Normalization Safety shoes Principate Briefing before work, Using special lifting before work, Using special lifting captore work Safety shoes Giet your grinder ready Worker is crushed by the object work is prains M Make a special place to put the grinding machine cable First Aid Worker is cable Bruises, sprains M Make a special place to put the grinding machine cable Worker ready The worker is cartehed by a grinder Burns L Check the grinding machine cable Worker's hand is scratched by a grinder Worker's hand is scratches, scratches, softwark, to use Additional company healthcare services Using a grinding machine tab in good condition and according to suddraw by a grinder Workers inhale dust place Shortness of breath, for use for use PPE Briefing before work, forming a K3 work according to SOP. Drilling Laying material Workers are splashed with see grinding material for use PPE Briefing before work, forming a K3 work according to SOP. Drilling Laying material Worker are splashed with by a sprainse, broken was broken where is a briefing before work, for the cuting knife states broken work according to SOP. Breefing before work, Checking the grinding work according to SOP. </td <td></td> <td></td> <td>plate</td> <td></td> <td></td> <td></td> <td>Giving sanctions to</td> <td></td>			plate				Giving sanctions to	
Prilling The worker is crushed by the material to be moved L Briefing before work, Using special lifting equipment to lift material, Providing Safety shoes Get your ready Worker trips over achine ready Bruises, sprains M Make a special place to put the grinding machine cable Safety shoes Make a special place to put the grinding machine Burns L Check the grinding machine cable Safety shoes The worker is electrocuted Burns L Check the grinding machine cable Safety shoes Worker's hand is scratched by a grinder Burns L Check the grinding machine cable Safety shoes Worker's inhale dust Burns L Using a grinding machine that is in good condition and according to standards Safety shoes, services Workers inhale dust Shortness of breath, cough L Briefing before work, forming a K3 Wear a protective mask Workers inhale dust Shortness of breath, cough L Briefing before work, forming a k3 Wear a protective sanctions if not doing work according to SOP. Gives strict sanctions if not doing work according to SOP Safety shoes, geggles Drilling Laying material Worker squeezed material Bruises, abrasions, broken L Breefing before work, Grinding peofore work, SOP Drilling Laying material Worker squeezed material Bruises, broken broke							workers who do not	
Intervaluel is crushed by the material to be moved bruises bruises primes L Diffing before work, calibric material, Providing First Aid Safety shoes Get your grinder ready First Sover grinding eable Bruises, sprains M Make a special place to put the grinding machine cable Safety shoes Get your grinder ready The worker is sover grinding Burns L Make a special place to put the grinding machine cable Worker's hand is scratched by a grinder Burns L Check the grinding machine cable Worker's hand is scratched by a grinder Wounds, scratched by a grinder L Worker's hand is grouting Wounds, scratched by a grinder L Worker's hand is grouting Shortness of breath, cough L Worker's hand is grouting Shortness of breath, cough L Worker's are splashed plates that plate Shortness of breath, cough L Worker's from cutting Bruises, abrasions L The worker was hife Bruises, abrasions L Drilling Laying material Scratch work according to sore Drilling Laying material			The worker				Use PPE Driefing before work	
Prilling Laying Worker Starty shoes L Starty shoes Starty shoes Drilling Laying Worker Bruises, sprains M Make a special place to put the grinding machine cable Starty shoes Get your Get your Bruises, sprains M Make a special place to put the grinding machine cable Starty shoes Get your The worker is electrocuted Burns L Check the grinding machine cable Starty and ensure the cable is safe when used. Additional company healthcare services Vertex Morker's hand is scratched, by a grinder Shortness, of breach, forming a K3 L Using a grinding machine this is in good condition and according to standards Flatten the cut plate Workers are splashed with steel plates that be grinding more sources Shortness of breach, forming a K3 L Briefing before work, Grinding according to SOP. Gives strict Sources who do not use PPE Drilling Laying material Worker substricts, spin before work, grinding work according to SOP. Safety shoes, goggles Drilling Laying material Worker squeezed material, broken would be fore work, Checking the grinding work according to SOP. Safety shoes, goggles			is crushed				Using special lifting	
Prilling Laying Worker Bruises, sprains M Material, Providing Material, Providing First Aid Get your Bruises, sprains M Make a special place acable Burns L Make a special place ready The worker Burns L is Burns L Check the grinding machine cable ready The worker' Burns L vorker's Burns L Check the grinding machine cable vorker's Burns L Check the grinding machine cable vorker's Burns L Check the grinding machine cable vorker's Burns L Using a grinding machine that is in good condition and according to standards scratched scratches, of breath, cough L Briefing before work, forming a K3 frind Cuttor Bruises, of breath, cough L Briefing before work, forming a k3 plate Workers Bruises, are splashed with steel plates that be grinding work according to SOP, Gives strict Safety shoes, goggles Drilling Laying material Worker, squeezed broken and ensuring the cuting knife is safe to use			by the	bruises	L		equipment to lift	Safety shoes
Get your grinder ready Bruises, sprains M Make a special place to put the grinding machine cable Make a special place to put the grinding machine cable Get your grinder ready The worker is electrocuted Burns L Make a special place to put the grinding machine cable Worker's hand is electrocuted Burns L Check the grinding machine cable Worker's hand is of breath, cough Worker's standards L Worker's hand is electrocuted Shortness of breath, cough L Workers inhale dust of breath, cough Shortness of breath, cough L Workers inhale dust of breath, cough Shortness of breath, cough L Workers inhale dust plate Shortness of breath, cough L Workers inhale dust plates that bounce off during the grinding process Shortness of breath, cough L Drilling Laying material Worker strated bounce off during the grinding work according to solution and according to solution and according to solution and according to solution and according to SOP, Gives strict sanctions if not doing work according to SOP, Gives strict sanctions if not doing work according to SOP SOP Drilling Laying material Bruises, abraisons, broken L			material to				material, Providing	2
Get your grinder ready Bruises, sprains M Make a special place to put the grinding machine cable The worker ready The worker is electrocuted Burns L Worker's hand is scratched by a grinder Burns L Worker's hand is scratched by a grinder Worker's scratched, by a grinder Using a grinding machine that is in good condition and according to standards Flatten plate Workers re splashed with steel plates that bounce off abruing the grinding material Shortness of breath, cough L Drilling Laying material Worker surges Scratch scratches, bounce off abrasions, bounce off abrasions, bounce off abrasions, bounce off abrasions, broken L Briefing before work, Grinding according to SOP, Gives strict sanctions if not doing work according to SOP, Gives strict sanctions if not doing work according to SOP Safety shoes, goggles Drilling Laying material Workers surginal Bruises, bounce off abrasions broken L Breefing before work, Grinding according to SOP Safety shoes, goggles			be moved				First Aid	
Get your grinder ready Get your able Bruises, sprains M Druike a specin place to put the grinding machine cable The worker ready The worker is electrocuted Burns L Worker's hand is scratched by a grinder Burns L Worker's inhale dust from cutting Worker's inhale dust from cutting Worker's inhale dust from cutting Vounds, scratched, by a grinder L Worker's inhale dust from cutting Shortness of breath, cough L Briefing before work, forming a K3 division, imposing standards Worker's inhale dust from cutting Shortness of breath, cough L Briefing before work, Grinding according to standards Worker's inhale dust from cutting Shortness of breath, cough L Briefing before work, Grinding according to SOP, Gives strict Worker's inhale shat bounce off during the grinding mine the exit plate Bruises, abrasions, during the grinding knife L Drilling Laying material Worker squeezed material, bounce Bruises, abrasions, broken L			Worker				Maka a special place	
Get your grinder ready Get your grinder machine cable sprains cable machine cable Check the grinding machine cable The worker is electrocuted Burns L Check the grinding machine cable Check the grinding machine cable Worker's hand is scratched by a grinder Wounds, scratched, by a grinder L Using a grinding machine that is in good condition and according to standards Worker's hand is scratched by a grinder Shortness of breath, cough L Briefing before work, forming a K3 Worker's hand is scratched by a grinder Shortness of breath, cough L Briefing before work, Grinding according to SOP, Gives strict sanctions of not doing work according to SOP Flatten the cut plates Bruises, abrasions knife L Briefing before work, Grinding according to SOP Safety shoes, goggles Drilling Laying material Worker's spateca L Breefing before work, Checking the grinding of the cutting knife Drilling Laying material Worker's spateca Bruises, abrasions, broken L			grinding	Bruises,	М		to put the grinding	
Get your ginder ready cable			machine	sprains			machine cable	
grinder ready The worker is electrocuted Burns L Check the grinding machine cable regularly and ensure the cable is safe when used. Additional company healthcare services Vorker's hand is scratched by a grinder Worker's scratched by a grinder L Using a grinding machine that is in good condition and according to standards Workers inhale dust from cutting Shortness of breath, cough L Briefing before work, division, imposing sanctions on workers who do not use PPE Flatten the cut plate Workers are splashed with steel plates that bounce off during the grinding Bruises, abrasions wound L The worker was hit by a grinding Scratch abrasions L Breefing before work, Grinding according to SOP, Gives strict sanctions if not doing work according to SOP Safety shoes, goggles Drilling Laying material Workers gruezed Bruises, abrasions, bones L Drilling Laying material Workers gruezed Bruises, abrasions, bones Post ar bones a protective safet shoes, gogeles		Get vour	cable				~	
ready is electrocutedThe worker is electrocutedBurns BurnsLInfactme callor regularly and ensure the cable is safe when used. Additional company healthcare servicesWorker's hand is scratched by a grinderWounds, scratched by a grinderLUsing a grinding machine that is in good condition and according to standardsWorker's inhale dust from the cuttingWorker's hand is scratched by a grinderLBriefing before work, forming a K3 division, imposing sanctions on workers who do not use PPEWear a protective maskFlatten the cut plateWorkers are splashed with steel plates that bounce off during the grinding woundLBriefing before work, Grinding according to SOPWear a protective maskDrillingLaying materialWorker s squeezed materialBruises, abrasions, are splashed woundLBreefing before work, Checking the grinding of the cutting knife before work according to SOPSafety shoes, sanctions if not doing work according to SOPDrillingLaying materialWorker s sariesBruises, abrasions, brokenLBreefing before work, Checking the grinding of the cutting knife before work, according to sordDrillingLaying materialWorker subrashBruises, abrasions, brokenLDrillingLaying materialWorker subrashBruises, abrasions, brokenLDrillingLaying materialWorker subrashBriefing		grinder					Check the grinding	
Instruction is electrocutedBurns electrocutedLthe cable is safe when used. Additional company healthcare servicesWorker's hand is by a grinderWorker's hand is scratched by a grinderUsing a grinding machine that is in good condition and according to standardsWorkers re from cuttingShortness of breath, coughLUsing a grinding machine that is in good condition and according to standardsFlatten the cut plateWorkers are splashed with steel plates that bounce off during the grinding woundLBriefing before work, forming a K3 division, imposing sanctions on workers who do not use PPEWear a protective maskThe worker was hit by a grinding knifeScratch woundLBriefing before work, Crinding according to SOP, Gives strictSafety shoes, gogglesDrillingLaying materialWorkers are splates that bunce off during the grinding knifeBruises, abrasions abrasionsLDrillingLaying materialWorker materialBruises, abrasions, bonesLDrillingLaying materialWorker materialBruises, abrasions, bonesLDrillingLaying materialWorker materialBruises, abrasions, bonesLDrillingLaying materialWorker materialBruises, abrasions, brokenLDrilling hactingLaying material, ProvidingBruises, abrasions, brokenL <td></td> <td>ready</td> <td>The worker</td> <td></td> <td></td> <td></td> <td>regularly and ensure</td> <td></td>		ready	The worker				regularly and ensure	
Prilling Laying Worker Bruises, squeezed material L used. Additional company healthcare services Drilling Laying Worker Scratch space L Using a grinding machine that is in good condition and according to standards Drilling Laying material Worker Scratch space L Briefing before work, forming a K3 Drilling Laying material Worker Bruises, abrasions, broken L Breefing before work, forming a K3			is	Burns	L		the cable is safe when	
Drilling Laying material Worker work squeezed material Worker squeezed material Worker squeezed material Worker squeezed material Shortness scratches, band is scratched, by a grinder L Using a grinding machine that is in good condition and according to standards Workers inhale dust from cutting Shortness of breath, from cutting L Briefing before work, forming a K3 work according to standards Wear a briefing before work, forming a K3 bounce off abrasions Workers are splashed with steel plates that bounce off abrasions L Briefing before work, Grinding according to SOP, Gives strict sanctions if not doing work according to SOP Safety shoes, safety shoes,			electrocuted				used. Additional	
Worker's hand is scratched by a grinderWounds, scratched, by a grinderLUsing a grinding machine that is in good condition and according to standardsWorkers inhale dust from cuttingShortness of breath, coughLBriefing before work, forming a K3 who do not use PPEFlatten the cut plateWorkers are splashed with steel plate stata bounce off during the grinding motionsBriefing before work, forming a K3 motivision, imposing sanctions on workers maskWear a motivision, imposing sanctions on workers maskFlatten the cut plateWorkers are splashed with steel plates that bounce off during the grinding mrocessLBriefing before work, Grinding according to SOP, Gives strict sanctions if not doing work according to SOPSafety shoes, gogglesThe worker was hit by a grinding knifeScratch woundLBreefing before work Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to useDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenLBriefing before work, Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to use							company healthcare	
Worker's hand is scratched by a grinderWounds, scratched, by a grinderLBornachine that is in good condition and according to standardsWorkers inhale dust from cuttingShortness of breath, coughLBriefing before work, forming a K3Wear a protective maskFlatten the cut plateWorkers are splashed with steel plate sthat bounce off during the grinding processShortness of breath, coughLBriefing before work, forming a K3Wear a protective maskFlatten the cut plateWorkers are splashed with steel plate sthat bounce off during the grinding hrifeShortness of breath, ecushLBriefing before work, Grinding according to SOP, Gives strict sanctions if not doing work according to SOPSafety shoes, gogglesThe worker was hit by a grinding knifeScratch woundLBriefing before work Checking the grinding of the cutting knifeDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenLBriefing before work, Checking the grinding of the cutting knifeDrillingLaying materialWorker squeezed materialBruises, abrasions, abrasions, brokenBriefing before work, Checking the grinding of the cutting knifeDrillingLaying material, ProvidingBruises, abrasions, abrasions, brokenHPost a pinch hazard K3 briefing before work, Using special lifting equipment to lift material, Providing </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Using a grinding</td> <td></td>							Using a grinding	
Image is a scratched by a grinderWounds, scratches, scratches, by a grinderLgood condition and according to standardsWorkers inhale dust from cuttingShortness of breath, coughLBriefing before work, forming a K3 division, imposing sanctions on workers who do not use PPEWear a protective maskWorkers are splashed with steel plates that bounce off during the grinding processBruises, abrasions during the grinding processLBriefing before work, forming a K3 division, imposing sanctions on workers who do not use PPEThe worker was hit by a grinding knifeScratch abrasionsLBreefing before work, Grinding according to SOP, Gives strict sanctions if not doing work according to SOPDrillingLaying materialWorker squeezed materialLBriefing before work, Checking the grinding of the cutting knife before work, abrasions, broken broken material			Worker's	W 1.			machine that is in	
by a grinderaccording to standardsby a grinderWorkers inhale dust from cuttingShortness of breath, coughBriefing before work, forming a K3 division, imposing sanctions on workers who do not use PPEFlatten the cut plateWorkers are splashed with steel plates that during the grinding moreessShortness of breath, coughLBriefing before work, forming a K3 division, imposing sanctions on workers who do not use PPEThe worker was hit by a grinding knifeScratch woundLLDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenLDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenH			nand 18 scratched	wounds, scratches	L		good condition and	
View standardsBriefing before work, forming a K3 division, imposing sanctions on workers who do not use PPEFlatten the cut plateWorkers are splashed with steel plates that during the grinding moreesBriefing before work, forming a K3 division, imposing sanctions on workers who do not use PPEWorkers are splashed with steel plates that bounce off during the grinding mrocessLBriefing before work, Grinding according to SOP, Gives strict SOPSafety shoes, gogglesThe worker was hit by a knifeScratch woundLLBreefing before work Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to useSafety shoes, gogglesDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenHPost work are where where where where where where where where where whereBriefing before work, Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to use			by a grinder	seratenes,			according to	
Priling Laying Workers Shortness of breath, cough L forming a K3 Wear a protective sanctions on workers Drilling Laying Morkers Shortness of breath, cough L division, imposing sanctions on workers mask Drilling Laying Workers Scratch L Bruises, abrasions, brokers L Briefing before work, Grinding according to SOP, Gives strict Safety shoes, goggles Drilling Laying material Worker Scratch L Bruises, abrasions, broker Briefing before work, Grinding according to SOP, Gives strict Safety shoes, goggles Drilling Laying material Worker Scratch L Breefing before work, Checking the grinding Grinding Drilling Laying material Worker Bruises, abrasions, broken L Briefing before work, Using special lifting Drilling Laying material Worker Bruises, abrasions, broken H Work area broken Worker Bruises, abrasions, broken H Briefing before work, Using special lifting Drilling Laying Worker Bruises, abrasions, broken H Worka							standards Briefing before work	
DrillingLaying materialWorker squeezed materialof breath, coughLLdivision, imposing sanctions on workers who do not use PPEprotective maskImage: Note of the cutting plateWorkers are splashed with steel plates that bounce off abrasionsImage: Note of the cutting before work, Grinding according to SOP, Gives strict SOP, Gives strict SOPSafety shoes, safety shoes, gogglesImage: Note of the cutting before with steel plates that bounce off abrasionsImage: Note of the cutting before work, Grinding according to SOPSafety shoes, safety shoes, sanctions if not doing work according to SOPImage: Note of the cutting the grinding houseScratch woundImage: Note of the superviseImage: Note of the superviseImage: Note of the cutting before work and ensuring the cutting knifeImage: Note of the superviseImage: Note of the superviseImage: Note of the superviseImage: Note of the cutting before work and ensuring the cutting knifeImage: Note of the superviseImage: Note of the superviseImage: Note of the superviseImage: Note of the supervise work are workImage: Note of the superviseImage: Note of the superviseImage: Note of the superviseImage: Note of the superviseImage: Note of the supervise workImage: Note of the superviseImage: Note of the superviseImage: Note of the superviseImage: Note of the superviseImage: Note of the supervise superviseImage: Note of the superviseIm			Workers	Shortness			forming a K3	Wear a
Flatten the cut plateRound cuttingcoughsanctions on workers who do not use PPEmaskWorkers are splashed with steel plates that bounce off during the grinding processBruises, abrasionsLBriefing before work, Grinding according to SOP, Gives strict sanctions if not doing work according to SOPSafety shoes, gogglesThe worker was hit by a grinding knifeScratch woundLLBreefing before work Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to useDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenHDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenH			inhale dust	of breath,	L		division, imposing	protective
Flatten the cut plateWorkers are splashed with steel plates that bounce off during the grinding processBruises, abrasionsLBriefing before work, Grinding according to SOP, Gives strict sanctions if not doing work according to SOPSafety shoes, gogglesThe worker was hit by a grinding knifeScratch woundLLBreefing before work Checking the grinding of the cutting knife before work and ensuring the cutting knifeDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenLBriefing before work, Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to use			cutting	cough			sanctions on workers	mask
Flatten the cut plateFlatten splashed with steel plates that bounce off during the grinding processBruises, abrasionsLBriefing before work, Grinding according to SOP, Gives strict sanctions if not doing work according to SOPSafety shoes, gogglesThe worker was hit by a grinding knifeScratch woundLLBreefing before work Checking the grinding of the cutting knifeDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenHPost work area work area work area work area work area work area work area			Workers				who do not use PPE	-
Pratien the cut platesplashed with steel plates that bounce off during the grinding processBruises, abrasionsBruises, abrasionsBruises, sanctions if not doing work according to SOP, Gives strict sanctions if not doing work according to SOPSafety shoes, gogglesThe worker was hit by a grinding knifeScratch woundLLBreefing before work Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to useSafety shoes, safety shoes, gogglesDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenLBreefing before work Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to useDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenHHWork area where there is aPost work area where there is aBriefing before work, Using special lifting equipment to lift material, Providing		Elattan	are					
Internal platewith steel plates that bounce off during the grinding processBruises, abrasionsLGrinding according to SOP, Gives strict sanctions if not doing work according to SOPSafety shoes, gogglesThe worker was hit by a grinding knifeScratch woundLLBreefing before work Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to useBreefing before work Checking the grinding woundDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenHPost hazard K3 sign in the work area where there is a a material, Providing		the cut plate	splashed	Bruises,	L		Briefing before work,	
DrillingLaying materialWorker squeezed materialBruises, 			with steel plates that bounce off				Grinding according to	
DrillingLaying materialWorker squeezed materialBruises, abrasions, brokenBruises, abrasions, 							SOP, Gives strict	Safety shoes,
grinding process grinding process SOP The worker was hit by a grinding knife Scratch wound L Breefing before work Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to use Drilling Laying material Worker squeezed material Bruises, abrasions, broken benes H Post work area work area where there is a Briefing before work, Using special lifting equipment to lift material, Providing			during the	dordsions			work according to	2022103
Drilling Laying material Worker squeezed material Bruises, abrasions, broken H H Post a pinch hazard K3 sign in the work area where there is a Briefing before work, Using special lifting equipment to lift material, Providing			grinding				SOP	
DrillingLaying materialWorker squeezed materialBruises, abrasions, bonesBruises, abrasions, bonesHBreefing before work Checking the grinding of the cutting knife before work and ensuring the cutting knife is safe to useDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenBruises, abrasions, brokenBruises, abrasions, brokenBruises, abrasions, brokenBruises, abrasions, brokenBruises, abrasions, brokenBriefing before work, Using special lifting equipment to lift material, Providing			process					
DrillingLaying materialWorker squeezed materialBruises, abrasions, bonesBruises, abrasions, bonesPost a pinch hazard K3 there is aBriefing before work, Using special lifting equipment to lift material, Providing							Breefing before work	
Was hit by a grinding knifeScratch woundLof the cutting knife before work and ensuring the cutting knife is safe to useDrillingLaying materialWorker squeezed materialBruises, abrasions, brokenPost a pinch hazard K3 sign in the work area where there is aBriefing before work, Using special lifting equipment to lift material, Providing			The worker				Checking the grinding	
Drilling Laying material Worker squeezed material Bruises, abrasions, broken Bruises, abrasions, broken H Post a pinch hazard K3 sign in the work area where there is a Briefing before work, Using special lifting equipment to lift material, Providing			was hit by a	Scratch	L		of the cutting knife	
DrillingLaying materialWorker squeezed materialBruises, abrasions, brokenPost a pinch hazard K3 sign in the work area there is aBriefing before work, Using special lifting equipment to lift material, Providing			grinding	wound			before work and	
Drilling Laying material Worker squeezed material Worker bones H H Post a pinch hazard K3 sign in the work area where there is a the			KIIIIC				knife is safe to use	
Drilling Laying material Worker squeezed material Worker bones Bruises, abrasions, broken bones H H H H H H H H H H H H H H H H H H H						Post a		
Drilling Laying material Worker squeezed material Worker squeezed material Bruises, broken bones Bruises, abrasions, broken bones						pinch		
Drilling Laying material Worker squeezed material worker bones broken broken broken broken broken broken bones broken broke				Bruissa		hazard K3	Briefing before work,	
Drilling material squeezed material broken bones house there is a equipment to lift material, Providing		Laving	Worker	abrasions		work area	Using special lifting	
material bones there is a material, Providing	Drilling	material	squeezed	broken	Η	where	equipment to lift	
there is a First Aid			material	bones		there is a	First Aid	
potential						potential		
hazard						hazard		

	Rare			Rick	Risk control		
Process	Jobs	Danger	Stake	level	Technical control	Administrative control	PPE
		Backache workers	Back pain	L		Briefing before work, Using special lifting equipment to lift material, Providing First Aid	
	Make a hole in the plate	Worker trips over drill string	Sprains, abrasions	L		Make a special place for laying the drill machine cable	
		Workers exposed to splash gram	Scuffs, scratches	L		Briefing before work, Providing First Aid, Establishing K3 Division, Providing sanctions for employees who do not use PPE, Increasing health services	Safety gloves, safety shoes, goggles
	Prepare the welder	worker trips over welding cable	Blisters, bruises	L		Make a special place for laying the welding machine cable	
welding	Welded steel plate	Workers inhale welding fumes	Out of breath	L		Briefing before work, Providing First Aid, Imposing sanctions for employees who do not use PPE, Forming a K3 Division, Adding company health services	Face mask
		Workers exposed to welding fire	Burns, burns	М		Briefing before work, Giving first aid, Giving sanctions to employees who do not use PPE	Safety gloves
		Workers exposed to welding radiation	Damage to eyes and skin	М		Not doing continuous welding work within 2 hours, Resting gradually, Adding company health services	Welding masks/covers
painting	Painting all materials	Worker painting too close	Dizziness, fainting	L		Briefing before work, Not doing sandblasting work continuously within a maximum of 2 hours, Providing First Aid, Establishing an OHS Division, Adding company health services	Face mask

Results Analysis

Based on the results of data processing, we get the risk level in the fabrication process at PT. xyz as follows:

- a. In the marking process there are risks that are included in the low category where the low level of risk indicates an acceptable level of risk and direction is needed
- b. In the cutting process there is a low risk of moderate risk. a low risk level indicates an acceptable level of risk and direction is needed, a moderate risk level where action is needed to reduce risk.
- c. In the grinding process there is a moderate risk. a low risk level indicates an acceptable level of risk and direction is needed, a moderate risk level where action is needed to reduce risk.
- d. In the drilling process there is a high risk. a low risk level indicates an acceptable level of risk and direction is needed, a high risk level indicates that treatment must be carried out immediately
- e. In the welding process there is a moderate risk. a low risk level indicates an acceptable level of risk and direction is needed, a moderate risk level where action is needed to reduce risk.
- f. In the painting process there are risks that are included in the low category where the low risk level indicates an acceptable level of risk and direction is needed

Conclusion

From the results of the risk assessment for each job, there is one highest level of risk, namely in the drilling section with a probability value of three and a severity level of four. The results of risk control in the fabrication process can be carried out by means of technical control (improving or adding technical facilities or equipment such as adding K3 signs), administrative control (risk control by making rules, procedures, work instructions that are safer or healthier). checks), and the use of personal protective equipment.

Reference

- [1] C. Pokphand, P. Martino, DI Rinawati, and R. Rumita, "Analysis of Occupational Accident Hazard Identification Using Job Safety Analysis (JSA) with the Hazard Identification, Risk Assessment and Risk Control (HIRARC) Approach," 2013.
- [2] MR Jannah, S. El Unas, and MH Hasyim, "On the Case Study of the Tower X Development Project in Jakarta (Risk Analysis of Occupational and Safety Using the HIRADC Approach and Job Safety Analysis Method in the Case Study of Tower Project X in Jakarta),"*Tech. Civil*, p. 9, 2014.
- [3] S. Case, PT Tamora, and A. Lestari, "Identification of Hazards, Occupational Accident Risks and Proposals for Improvements Using the Job Safety Analysis (Jsa) Method," vol. X, pp. 42–52, 2022.
- [4] A. Rahayu, HM Kholik, and DP Restuputri, "Efforts to Reduce Human Error in Work Accidents Using Sherpa and Jsa Methods at Perum Perhutani KBM - Gresik Wood Industry," *J. Tek. ind.*, vol. 16, no. 2, p. 53, 2017, doi: 10.22219/jtiumm.vol16.no2.53-62.
- [5] LY Prastowo, AS Wahyuningsih, and I. Article, "HIGEIA JOURNAL OF PUBLIC HEALTH," vol. 4, no. Special 1, pp. 1–12, 2020.
- [6] D. Fathezia Ariani, "Factors Associated with Occupational Accidents in Workers in the Production Section of Pt Abaisiat Raya Padang City in 2022," 2020.
- [7] N. Rosdiana, SK Anggraeni, and A. Umyati, "Identification of Occupational Accident Risks in the Bridge Project Production Area Using the Job Safety Analysis (JSA) Method," vol. 5, no. 1, pp. 1–6, 2017.
- [8] K. Kunci, "Scientific Journal of Health," vol. 20, no. 2, pp. 58–65, 2021.
- [9] Saloni Waruwu, "Analysis of occupational health and safety (K3) factors that significantly affect work accidents in student castle apartment development projects," no. November, 2021, doi: 10.12928/si.v14i1.3705.
- [10] P. Marfiana, HK Ritonga, and M. Salsabiela, "Implementation of Job Safety Analysis (JSA) as an Effort to Prevent Work Accidents," *J. Migasian*, vol. 3, no. 2, pp. 25–32, 2019.
- [11] TN Asih, "E-ISSN: 2621-8933 JUSTI (Journal of Systems and Industrial Engineering)," 2018.
- [12] R. Alfatiyah, "Analysis of occupational safety and health risk management using the hierarchical method for casting section work," vol. 11, no. 2, pp. 88–101, 2017.
- [13] AZ Abidin and NA Mahbubah, "Construction Worker Risk Mapping Based on the Job Safety Analysis Method at PT BBB," vol. VI, no. 3, pp. 2111–2119, 2021.
- [14] Y. Ilmansyahet al., "IMPLEMENTATION OF JOB SAFETY ANALYSIS AS AN EFFORT," vol. 8, no. 1, 2020.
- [15] A. Levi, "Proposed Work Safety Improvements Using Job Safety Analysis (Jsa) And Failure Mode And

Effect Analysis (FMEA) methods," pp. 151-167, 2017.

- [16] P. Sukapto, H. Djojosubroto, and H. Permana, "Application of the Job Safety Analysis and Risk Score Method to Improve Occupational Safety and Health in the Printing, Sewing and Assembly Departments of PT. PAI, Bandung (A Participatory Ergonomic Approach),"*J. Health.*, vol. 9, no. 3, p. 403, 2018, doi: 10.26630/jk.v9i3.994.
- [17] S. Ramli, "SMART Safety".
- [18] S. Silvia, C. Balili, and F. Yuamita, "Analysis of Mechanical Accident Risk Control in the Ampana Power Plant Project (2x3 Mw) Using the Job Safety Analysis (JSA) Method," vol. 1, no. 13, pp. 61–69, 2022.
- [19] J. Bawang, PA T Kawatu, R. Wowor, and F. Public Health at Sam Ratulangi University ABSTRACT, "Analysis of Potential Hazards Using the Job Safety Analysis Method at the Shipping Site Pakal PT. Aneka Tambang Tbk. UBPN North Maluku,"*J. HEALTH*, vol. 7, no. Vol. 7No. 5 (2018): Volume 7, Number 5, September 2018, pp. 1–15, 2018.
- [20] M. David and Heri Tri Irawan, "Analysis of Potential Hazards in the Palm Oil Processing Process at PT. Karya Tanah Subur Using Job Safety Analysis (JSA),"J. Inotera, vol. 8, no. 1, pp. 20–26, 2023, doi: 10.31572/inotera.vol8.iss1.2023.id200.
- [21] A. Firdaus and F. Yuamita, "Efforts to Prevent Occupational Accidents in the Grading Process of Palm Oil Tbs at PT. Sawindo Kencana Using the Job Safety Analysis (JSA) Method," J. Technol. and Manaj. ind. therapy., vol. 1, no. 3, pp. 155–162, 2022, doi: 10.55826/tmit.v1iiii.40.
- [22] AU Abidin and I. Ramadhan, "Application of Job Safety Analysis, Knowledge of Occupational Safety and Health on Occupational Accidents in Higher Education Laboratories," J. Berk. healthy., vol. 5, no. 2, p. 76, 2019, doi: 10.20527/jbk.v5i2.7827.
- [23] Putra F, Maniyani A, and Climateaturriza M, "Journal of Industrial Engineering," *J. Tek. ind.*, vol. 2, no. 1, pp. 51–57, 2021.
- [24] H. Journal, A. Permana, and AJ Nugroho, "Scientific Journal of Mechanical, Electrical and Computer Engineering Job Safety Analysis (Jsa) in the Pt Widya Inovasi Indonesia Workshop Area," J. Ilm. Tech. Machines, Electrical, and Computers., vol. 2, no. 1, pp. 63–73, 2022.
- [25] F. Setiabudi and A. Bhaskara, "Analysis Of Jsa And Ibprp Based On Permen PUPR No. 21 YEAR Case Study: Beam Structure Work on Learning Service Building Construction Project, Faculty of Social and Political Science, Jenderal Soedirman University Analysis Of Jsa And Ibprp Based On Regulation Of The Minister Of PUPR No. 21 of 2019 Case Study: Block Structure Work in the Learning Service Building Project of the Faculty of ISIP, Jenderal Soedirman University," no. 21, pp. 4–6, 2019.